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USDI Bureau of Land Management
Western Oregon Plan Revisions
PO Box 2965
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Dear BLM Staff:

I read with interest the sections of your *Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts* dealing with fish and hydrology. As a Professional Hydrologist registered with the American Institute of Hydrology and a Certified Forester with the Society of American Foresters, and with a Ph.D. in forest hydrology from Oregon State University, these topics are of keen interest to me. I want to commend the hydrology and fisheries staff members for the overall high quality of the review and assessment represented by this extensive document. I am in general agreement with the impact statement findings. The following comments represent additional thoughts and suggestions to enhance this document.

While I agree with the premise that wood is an important factor in fish habitat, there was a lack of discussion about other factors such as food supply. Wildlife biologists are recognizing that food is as important or more important than habitat in wildlife success. There is evidence that this is true for fish as well. The eruption of Mt. St. Helens created hot, sediment choked streams that might have been expected to be unproductive for fish, but those exposed channels resulted in high instream primary production rates and ultimately food for fish. Bisson et al. (1988) found productivity high for salmon stocked in part of the region impacted by the eruption even though stream temperatures were at levels that were considered either detrimental or lethal. Wilzbach et al. (2005) studied salmonid productivity in streams in northern California and found that opening streams enhanced fish productivity. A meta-analysis reported at the headwater conference in Vancouver, British Columbia, earlier this year (Mellina and Hinch 2007) found that fish density and biomass increased but large wood decreased where harvesting occurred close to streams without buffers. Reductions in fish were noted where wood was cleaned out of the stream. Finally, a study sponsored by the Coastal Oregon Productivity Enhancement (COPE) Project (Connolly and Hall 1994) found that the highest productivities for cutthroat trout occurred where there was a combination of hardwood overstory adjacent to streams and large wood in the channels. These results point to a duel control on fish productivity from both wood (for structure and cover) and food (as enhanced by increased light).

Recent discussions with Canadian scientists and fisheries policy experts point to an interest in active management within riparian areas to create a mosaic of conditions that reflect natural disturbance patterns. Dr. Brian Naylor with the Ontario Ministry of Natural Resources reported to me that,

> We're also in the process of rewriting our riparian direction. In the past, some clearcutting was permitted around some types of water, but it was rarely conducted (the conditions required to permit harvesting were generally too difficult to meet). Our new direction is actually trying to encourage the creation of a mosaic of early and later successional forest adjacent to water.

Dr. Naylor went on to note that,

> The basic tenet underlying our new guidelines is also emulation of natural disturbances. There was a lot of public opposition when we first introduced this concept to the management of 'upland' forests in our Natural Disturbance Pattern Emulation Guide in 2001. We foresee that there will be even more 'interest' when we introduce the concept into riparian areas in our revised guides.

The overall conclusion from this discussion is that large wood can be beneficial to fish populations, but it should be balanced with some disturbance near the stream to increase light and primary production to create "hot spots."

In the list of major factors affecting fish I didn't see fishing pressure (both ocean and stream). I'm reminded of a turn of the century (19^{th} to 20^{th}) report that described the need for a reduction in daily trout limit from 128 to 64 a day. Buchal (1998) did an excellent job of describing the impact of fishing pressure on Columbia Basin salmon runs. One suggestion has been that roads create risk to salmon and trout populations because they provide access for legal and illegal take of fish. I know that my former colleague, Dr. Walt Megahan, indicated a reluctance to conduct trout studies near his Idaho research watersheds because one effective fisherman could compromise the results.

One component of large wood that I did not see was the role of stream size in determining functional wood (Bilby and Bisson 1998; Bisson et al. 1987). For small streams, in particular, there may be opportunities for small diameter and length wood to provide important functions.

Agencies are often forced to make creative assessments using combinations of models and assumptions. I would like to see a plan to test the performance of your models and assumptions. For example, there is a large difference in the percent of watersheds that have received instream habitat projects (Eugene 25%; Klamath Falls 0%). With this large difference, are there trend data for fish to show that the instream habitat work is accomplishing its goals?

I was pleased to see the thoughtful discussion about sediment impacts, and particularly the timing of when sediment loads are occurring. Timing is often not accounted for in assessments. The Evans Creek example is fascinating and may reflect conditions such as those described earlier in Bisson et al. (1988), where food supply overcame less favourable habitat. The conditions that cause Evans Creek to remain productive for salmon despite high sediment loads need to be identified.

One note is that on page 372 you cite a study that found that 67% of sediment came from forest roads. This is based on a 1982 paper. Similarly, roads as a source of landslides and sediment are discussed later. Recent landslide surveys such as Robison et al. (1999) indicate that road sources have declined. This issue gets to some later comments that some of the major sediment benefits to BLM watersheds may come from remediation of existing roads. A recent audit of forest practices on both private and public lands in Montana found that more than 60% of active management sites experienced reduced sediment inputs to streams (Rogers 2006). This was largely a result of upgrading roads to existing water protection standards. This was a reduction in sediment, not minimization of new sediment contributions. At a recent workshop on road surfacing, Keith Mills, a geotechnical engineer with Oregon Department of Forestry (ODF), reported that past surveys found that 57 to 75% of the ODF road network drained to streams (hydrologic connectivity), but surveys of new or upgraded roads find that this rate is reduced to 15 to 34%. Based on visits to BLM lands, similar activities are occurring on your road systems as we better understand how to reduced sediment delivery to streams.

I was please to see that the draft EIS cites the draft General Technical Report being developed by Dr. Gordon Grant and colleagues to address impacts of forest management on peak flows. That draft report summarizes our understanding of the mechanisms and consequences of forest management on peak flows. Grant et al. (in review) report that most streams in this region are not susceptible to channel impacts from changes in peak flow that we expect from typical forest management activities. I have had a chance to review the report, and mostly agree with both its conclusions and your application of those conclusions to your lands. Your finding that a very limited number of basins are susceptible to channel damage from changes in peak flows is consistent with the Grant et al. report. Where there is a potential problem, management can be modified to address the concern. For example, the potential for channel movement might be an issue and a channel migration zone could be defined and protected.

One caution I want to raise to you is the reliance on the Washington Watershed Analysis road model. This is probably one of the most practical and applicable models that can be used and I believe it provides a reasonable picture of what "relative" impacts an overall road project may have. However, site-specific tests indicate that the model may not accurately predict specific problem road segments or may be an order of magnitude off in its estimates of sediment runoff. The National Council for Air and Stream Improvement, Inc. (NCASI) is currently supporting a cooperative project to test road models. The work is being conducted by Kathy Dubé with GeoDynamics. Preliminary results show problems with all road models used to estimate sediment runoff. A recent paper by Sugden and Woods (2007) found that the road erosion model the Washington model is based on severely overestimated sediment losses from roads in Montana. Despite our significant investment in road erosion models, it now appears that field inventories to identify problem road segments may be the most effective erosion control management approach.

On page 380 the draft EIS discusses findings by Swift about travel distances for sediment. This includes how fire affects travel distance (increases travel distance due to reduced surface roughness). However, it does not include work by Swift on roads where slash was used to increase roughness and reduce travel distance. Another useful, but difficult to obtain, summary of travel distance research is a paper by Woods et al. (2006). I would be happy to provide a copy if you cannot locate it. It has a nice summary of travel distances measured in other studies and discusses the finding that a majority of sediment deposition occurs in the first half of the sediment plume.

Page 382 includes a discussion about road management to reduce erosion. I again refer to Sugden and Woods (2007) and their finding that increased sediment losses resulted after grading. I have termed this phenomenon the Goldilocks Factor. If you don't grade frequently enough you can develop severe rutting and gullying that results in increased sediment losses, as the road prism no longer operates as designed. If you grade too frequently you continue to disturb the road and increase sediment losses. Grading needs to be conducted at a frequency that is "just right."

On page 391 there is an attempt to correlate watershed conditions with the level of activities. One of the principles the NCASI watershed program believes in is that ***how*** management occurs is just as important as ***how much***. I agree that watersheds are on an improving trend because of a combination of factors, not the least of which is an improving understanding of how to avoid significant impacts from forestry activities. There have been substantial changes in the forest practices on both BLM watersheds and the lands outside BLM management. Through a series of watershed studies at Hinkle Creek, the Alsea, and the Trask, the Watersheds Research Cooperative is attempting to assess the effectiveness of contemporary forest practice on private lands (http://watershedsresearch.org). The work at the Alsea will be particularly interesting (http://ncasi.org/programs/areas/forestry/alsea/default.aspx) because it will allow us to compare contemporary impacts with historic impacts. It will also test the value of adding wood (at the end of the study). We hope that BLM can explore opportunities to increase its support and cooperation with these projects.

The focus on instream restoration efforts in high intrinsic potential streams for salmon is a reasonable approach. NCASI is working with Dr. Kelly Burnett to explore how we can test salmon population trends for different management regimes using intrinsic potential to compare sites of similar quality for fish.

One of the highlighted issues related to fine sediment delivery (page 741) under Alternative 2 is approximately 400 acres of regeneration timber harvest along intermittent streams. This should not create a problem if an equipment exclusion zone or similar management controls are used to avoid direct disturbance to the intermittent channel. Again, we hope to test the effects of different management approaches at Needle Branch under the Alsea Watershed Study Revisited by monitoring runoff and water quality below a non-fish-bearing reach (no streamside management area required under the Oregon Forest Practices Act) and a fish-bearing reach (streamside management zone required). Work from across the country indicates that sediment loads in intermittent streams can be minimized by not directly disturbing the channels. The result from Hinkle Creek (non-fish-bearing reaches requiring no streamside management zone) will also be important to your assessment.

A recent thesis by Cody Hale (Hale 2007) from Oregon State University on the Alsea Watershed Study Revisited also demonstrated the recuperative potential of watersheds in western Oregon (from extreme practices in the 1960s). The only water quality parameter that appears to be outside the 95% confidence limits established for the treatment and control watersheds for this study (beginning in 1959) is nitrate-nitrogen. This nutrient is probably elevated in Needle Branch due to the increase in alder in the riparian area. A number of posters at the Society of American Foresters National Convention in Portland, Oregon, next week will address forest watersheds in general as well as results from the Alsea Watershed and other Watersheds Research Cooperative studies.

Another issue related to Alternatives 2 and 3 is use of primary and secondary shade zones and the potential to increase stream temperature in the Coquille Forest. Use of primary and secondary shade zones provide an opportunity to optimize for a high degree of shade protection but still provide some additional management opportunities. As discussed earlier, many forest ecologists and watershed specialists are now looking at some active management in riparian areas to create a favourable mosaic of conditions. It is likely that a 1°F increase in temperature per mile (modeled) would never be experienced due to mixing with hyporheic water and cooling in features such as sediment wedges.

CONCLUSION

BLM is presented with the very difficult task of comparing the environmental impact of management alternatives. Above are some considerations for modifications to the draft EIS. Notwithstanding these comments, I find the hydrology, water quality, and fisheries assessments to be reasonable and thoroughly conducted. I agree with the overall conclusion that all four alternatives have similar outcomes for large wood recruitment and fish abundance. There may be management opportunities to create a mosaic of riparian conditions that could enhance fish productivity further. Sediment loads are also likely to experience little increase under the different alternatives, and treatment of existing road problems provides the greatest opportunities for reduced sediment loads. The key for fish and water quality is to provide management immediately adjacent to stream channels. Riparian functions diminish as management moves away from the stream. Increases in water temperatures for the Coquille Forest are unlikely if harvest blocks are discontinuous and staggered in time. The recent and ongoing review of the effects of forest management on peak flows is reassuring and points to a very limited number of sensitive watersheds. Ongoing improvements on BLM lands are matched by improved practices on private lands in these jointly managed watersheds. We encourage BLM to become more actively involved in the Watersheds Research Cooperative to test alternative management practices and their consequences on the hydrology, water quality, and biology of forest streams.

Yours,

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